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Providing the Right Intervention for the Right Person at the Onset of Homelessness Using Predictive Models

Problem

People living without addresses become invisible. The pieces of their lives captured in public records often remain unconnected, making them anonymous or quasi-anonymous, with at most their identities and fragments of their service histories known when they encounter service providers.

Roughly three-fifths of individuals who become homeless escape homelessness on their own or with limited help. Only two out of five people who become homeless stay homeless for one year or more. Ideally, individuals and families who will remain stuck in homelessness would immediately receive more intensive services as soon as they become homeless, or even before they are homeless, but usually this does not happen because their long-term outcome is not yet known.

Because it is hard to differentiate newly homeless individuals who will make rapid exits from those who will remain stuck in homelessness, the prevailing service delivery model calls for "progressive engagement." If individuals are connected with a service provider (many are not), progressively more help is given as individuals remain homeless longer. If individuals become chronically homeless, they are offered permanent supportive housing, if units are available.

While this meets a pragmatic need, many people are overlooked until they spend at least a year on the street. Progressive engagement leads to at least two problems:

1. The longer people are homeless, the worse their problems become, making it more difficult and expensive for them to become stably housed. The prevalence of serious health conditions and justice system encounters triple from the time individuals enter homelessness to the time they become chronically homeless and prospects for re-employment dwindle.

2. The flow of people into long-term homelessness is not reduced, so there is growing demand for the most expensive homeless intervention, permanent supportive housing, and meeting this demand is challenging.

In many California cities, the number of long-term homeless needing housing far exceeds the available housing supply, making it difficult to reduce the number of homeless people living in shelters and on the streets. The continuing flow of people into long-term homelessness overwhelms the supply of services and housing. Unless

the flow of people into chronic homelessness is reduced, it will be formidably difficult for California to house its way out of homelessness.

Approach

There is a first day of homelessness for everyone who becomes homeless, but multiple windows into their lives are often available in the records of agencies that have touched the individual or family. This includes demographic information, type and duration of social services, foster care, use of health services, medical diagnoses, indicators of substance abuse, justice system involvement, and homeless histories. By bringing these records together, it is possible to use this information to predict an individual or family's homeless trajectory.

Using longitudinal linked administrative records, such as those held by the State of California and counties, it is possible to build predictive models that match the right early, needs-based intervention with the right person when individuals enter homelessness.

In addition to *endgame strategies* for housing chronically homeless individuals based on acuity of need, predictive models can prioritize individuals for *critical time intervention strategies* for vulnerable individuals, as well as *pre-emptive strategies* for identifying new entrants who are likely to stay homeless and targeting them for early intervention.

Predictive analytic models can distinguish accurately between different types of homelessness and predict future outcomes. This can improve both the efficiency and effectiveness of homeless interventions. For example:

1. Predictive models can provide a fair, objective system for prioritizing who gets to be housed based on likely duration of homelessness or public costs.
2. Predictive models can identify newly homeless individuals who are likely to become persistently homeless so they can be targeted for early interventions that will help them escape homelessness with less distress and public cost.
3. Interventions can be provided that are specifically tailored to meeting the needs of discrete high-risk subpopulations.
4. Small reductions of the flow of people into chronic homelessness will have a large impact on reducing the number of chronically homeless individuals.
5. Helping people avoid long-term homelessness through early intervention is far less difficult and costly than dealing with the problems that come with persistent homelessness. High ongoing costs for health care and other public services are reduced.

Results

Documentation

The Economic Roundtable has built four predictive models, two that accurately identify individuals who will become high-cost users of public services and two that accurately identify individuals on the cusp on homelessness who will become persistently homeless. **Three reports are attached** that describe these evidence-based screening tools and the verified statistics that support them.

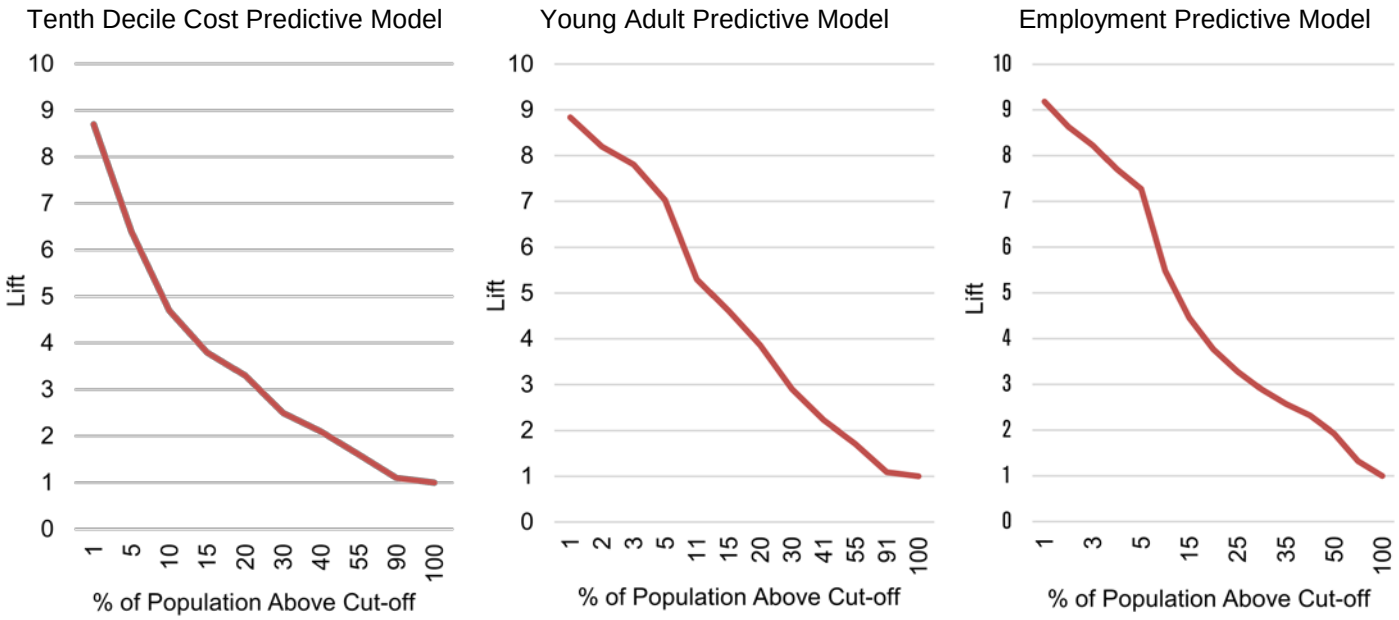
1. *Getting Home: Outcomes from Housing High Cost Homeless Hospital Patients.* Describes cost avoidance results from a Social Innovation Fund project that used a predictive analytic screening tool developed by the Economic Roundtable to identify 163 homeless patients in 15 Los Angeles hospitals, from 2011 to 2013, who were in the highest cost decile and immediately place them in permanent supportive housing after they were discharged.

2. *Prioritizing Homeless Assistance Using Predictive Algorithms: An Evidence-Based Approach.* This is a peer-reviewed article published in 2018 in HUD's journal, *Cityscape*. It describes the Silicon Valley Triage Tool that was developed to provide a fair, objective method for prioritizing which individuals should have immediate access to permanent supportive housing. The tool prioritizes high-cost individuals for whom the solution of housing costs less than the problem of homelessness. The screening tool was developed using linked administrative records for 114,000 residents of Santa Clara County who experienced homelessness over a seven-year period.

3. *Early Intervention to Prevent Persistent Homelessness: Predictive Models for Identifying Unemployed Workers and Young Adults who become Persistently Homeless.* Last month the Economic Roundtable released two new predictive models for identifying individuals who are likely to become persistently homeless as soon as they become homeless, or even before they are homeless. The first tool identifies the eight percent of low-wage workers who become persistently homeless after losing their jobs. The second tool identifies the eight percent of youth receiving public assistance who become persistently homeless in the first three years of adulthood. The tools were developed using administrative records of over seven-million Los Angeles County residents who received public assistance benefits from 2002 through 2015. Over one-million of these individuals experienced homelessness.

Statistical Accuracy

At the highest probability levels, the three most recently developed predictive models all produce outcomes that are roughly nine times more accurate than random selection, as shown by the *lift* of each model, which is the ratio between the results obtained with and without the predictive model.



The first model, shown on the left, is for individuals who will be in the highest cost decile in the coming two years. The second model, in the middle, is for youth receiving public assistance who will become persistently homeless in the three years after becoming adults. The third model, on the right, is for low-income workers who will become persistently homeless in the three years after losing a job.

All three models were built using logistic regression in order to make that factors that drive the models transparent and understandable to users and the public. A way of assessing the predictive power of a logistic regression model is the area under the Receiver Operating Characteristic (ROC) Curve, which shows the trade-off between true positives (correctly targeted individuals) and false positives (incorrectly targeted individuals) at all possible probability thresholds. The ROC value is considered strong when it exceeds 0.8. Values for the three models are:

1. *Silicon Valley triage tool for high-cost homeless:* 0.83
2. *Young Adult screening tool:* 0.88
3. *Unemployed Worker screening tool:* 0.89

Cost Avoidance

Each of the screening tools identifies individuals for whom the solution for helping them escape homelessness costs less than the problem if they remain homeless. The amount of public costs avoided by using the screening tools will vary based on the probability cut-off level used to determine who is eligible for an intervention. Differing cut-off levels result in differing combinations of true positives (correctly targeted individuals) and false positives (incorrectly targeted individuals). However, costs for all three groups are so high that savings offset the cost of the intervention.

- If the five percent of individuals with the highest probability of being high-cost homeless are placed in permanent supportive housing, the average annual cost savings for everyone housed, after paying the cost of housing, is estimated to be $12,000 per person.
- The ongoing annual public costs for unemployed workers who become persistently homeless is $13,700, compared to $8,000 for short-term homeless and $2,900 for unemployed workers do not become +homeless.
- Annual public costs for young adults who become persistently homeless are $8,700 and *ascend* steadily as health conditions and justice system involvement become more frequent. In comparison, young adults who do not become homeless have costs of $4,900 a year that *descend* steadily.

More Predictive Screening Tools Are Needed

More predictive screening tools are needed to match appropriate interventions with different groups within the population that experiences homelessness. The tenth decile screening tool leaves out 90 percent of the homeless population that has lower public costs, many of whom need only short-term housing and services. The two screening tools for youth and unemployed workers who become persistently homeless identify a total of 29 percent of the long-term homeless population. Additional tools are needed to identify groups that make up the other 71 percent.

Recommendations

It is simpler, more feasible and far less expensive to intervene early and help people get back into stable housing in their community. California should take the lead in creating predictive screening tools and data systems for connecting the right intervention with the right person at the onset of homelessness.

The essential information for building strong predictive models is available to the State. This includes: demographics, household structure, social services, foster care, employment, health care service history, medical diagnoses, justice system involvement, and homeless history.

Predictive models are system-based tools. They require information that is most readily available from public agencies. Because of the level of effort required to obtain and integrate the necessary data, the most efficient use of the tools is regular, ongoing system-wide screening of linked records. Screening clients individually is a fallback option. By using either system-wide or person-by-person screening, individuals can be prioritized for help that matches with their level and type of need.

All of the Economic Roundtable's work is in the public domain. We are available to help the State of California combat homelessness in any way we can. Our research reports can be downloaded at: https://economicrt.org/. For more information, please contact: Dan Flaming, President, danflaming@economicrt.org.